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1860 of large numbers of Tertiary mollusca from Australia and New Zealand, has made it possible for Professor Harris to present a very exhaustive review of the subject, the Gasteropoda particularly being described in great detail. The fine state of preservation of the specimens has led the author to consider the several forms both from an ontogenetic and phylogenetic standpoint, and as so little work of this character has been done on the Gasteropoda, hitherto, it must prove of fundamental importance in the systematic classification of this class of the mollusca.

The book contains a complete synonymy of all the forms catalogued, together with a description of such new material as the Museum possesses. The admirable figures which accompany the volume show in great detail the protoconchs of many of the Gasteropod types.

This report presents the first thoroughly systematic treatment of the Tertiary molluscan faunas of Australasia and will be of great service to the student of Tertiary mollusca in other portions of the world. Volume I will be succeeded by others in which the large Tertiary collections of the British Museum from other lands will be minutely described. There is no man better able to undertake this task than Professor Harris, as he is intimately acquainted with the Tertiary in many portions of the world, and probably has a more comprehensive knowledge of the Tertiary of central and western Europe than any one living. He has published an important memoir on the Eocene geology and palæontology of the Paris Basin, besides making contributions to the Tertiary of England.

The future publications of this series will be awaited with much interest by all students of Tertiary palæontology.

WM. B. CLARK.

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*Transactions of the American Institute of Mining Engineers, Vol.*

XXVI. February 1896, to October 1896 inclusive. Published by the Institute, New York City, 1897.

This number of the *Transactions* presents a goodly list of papers of especial interest to geologists. Of these we may mention the following :

*The Ore Deposits of the Australian Broken Hill Consols Mine*, Broken Hill, New South Wales. By GEORGE SMITH, pp. 69-78. This

is an interesting discussion on the concentration of dyscrasite and antimonial silver chloride where the lode is cut by cross veins or "indicators." The author finds it necessary to invoke the aid of the electro-magnetic currents of the earth's crust acting along the cross veins to account for this particular form of deposition.

*Copper Ores in the Permian of Texas.* By E. J. SCHMITZ, JR., pp. 97-108 (discussion p. 1051). The copper ores of the Texas Permian occur as pseudomorphs of wood or as nodules or copper-bearing shale, slate or clay, and was deposited under much the same conditions as the "*Hupperschiefer*" in the German Permian, the chief difference being that the American ore is in the main a carbonate or silicate, while the German is a sulphide.

*Vein Walls.* By T. A. RICKARD, pp. 193-241 (discussion p. 1153). A valuable dissertation upon the relation of ore deposition to the composition and structure of the inclosing strata.

*Sketch of a Portion of the Gunnison Gold Belt, Including the Vulcan and Mammoth Chimney Mines.* By ARTHUR LAKES, pp. 440-448.

*Gold in Granite and Plutonic Rocks.* By WILLIAM P. BLAKE, pp. 290-298. A summary of a number instances of the occurrence of gold as a primary constituent of granite and plutonic rocks.

*Faulting and Accompanying Features Observed in Glacial Gravel and Sand in Southern Michigan.* By CARL HENRICH, pp. 460-464 (discussion p. 1102). The faulting occurs in stratified gravel. The fault planes are from seven to twelve feet apart, and none have a throw of less than seven inches. Along these fault planes nodules have been formed by *ascending* currents of water. The explanation offered is that lateral pressure was caused by two glaciers converging along Silver Creek and Goose Creek valleys.

*Further Notes on the Alabama and Georgia Gold-Fields.* By WILLIAM H. BREWER, pp. 464-472.

*The Ore-Shoots of Cripple Creek, Colorado.* By EDWARD SKEWES, pp. 553-579. A detailed description of the ore-shoots of a portion of the Cripple Creek district, and their relations to the vein fissures.

*Traces of Organic Remains from the Huronian (?) Series at the Iron Mountain, Michigan, etc.* By W. S. GREESLEY, pp. 527-534. An account of the author's discovery of certain markings on the iron ore

upon the docks at Erie, Pa. which he indentifies as fossil remains. Three plates follow the article.

*The Phosphate Deposits of Arkansas.* By JOHN C. BRANNER, pp. 580-598. The phosphate deposits are reported in or associated with a narrow zone either of greenish or black shale, or a sandstone deposited between recognized Lower Silurian and Carboniferous strata. This interval represents the slow accumulation of organic matter in a comparatively deep sea. Phosphate nodules have also been found in some of the Cretaceous beds of the region.

*Magnetic Observation in Geological Mapping.* By HENRY LLOYD SMITH, pp. 640-709. The principles of plotting magnetic observation and applications to geological mapping, etc.

*Some Mines of Rosita and Silver Cliff, Colorado.* By S. F. EMMONS, pp. 773-822. The ore of the Bassic mine was deposited by fumoralic action as a phase of the dying activity of the volcano when  $H_2S$  and  $S_2O$  were the prevailing gases. The Bull-Domingo mine ores were deposited from aqueous solutions coming from a region of igneous eruptions close at hand.

Discussing the composition of descending surface waters and ascending deep waters Mr. Emmons concludes, in opposition to the prevalent belief, that decreasing temperature and pressure are not the principal determining causes of the precipitation of vein minerals from ascending solutions. Also that all the metallic minerals of the plateau were formed under the same conditions and during the same general phase of ore deposition, and their irregular dissemination is due to physical rather than to chemical causes.

He states also that "the heavy metals have probably been brought up from the interior of the earth within the magmas of igneous rocks, and that by some process of differentiation not yet completely understood either previous to, or during the process of cooling and consolidation, they have been concentrated within certain bodies or parts of bodies of eruptive rocks; and, further, that ore bodies as found at the present day are the result of a concentration (perhaps many times repeated) of the materials thus brought up, which are in all probability very finely disseminated through the present rock masses or combined in minute amounts in the more common basic minerals. This seems a more rational hypothesis, and one more in accordance with modern scientific practice, than to content oneself with assuming simply that

the ascending waters came charged with metallic minerals from the bathysphere, meaning thereby a region in the interior of the earth which is richer in heavy metals than any part of the earth's crust that comes under our observation ; for this simple assumption affords no explanation why metallic minerals are concentrated in one part of the earth's crust and not in another, and it supposes a free flow of waters at greater depths than in our present state of knowledge of terrestrial physics it is considered possible that channels which would admit of a flow of water through them would remain open.

“ Furthermore, if the vein-materials are found to form a constituent part, even in minute traces, of comparatively fresh and unaltered country-rocks in a given ore-bearing region, and at such distances from any water-channels as to render it improbable that these materials could have been brought in through these channels, it is reasonable to assume that these or similar rocks have been permeated by the waters from which the known ore deposits were precipitated, and that from them they derived their contained vein-materials. . . . It seems probable that not only the recent eruptives, but the older granites through which the ascending solutions must have passed, contain enough of the precious metals, and, it may be assumed also, of the other vein-materials to furnish, in the long time that is accorded to the accomplishment of most geological phenomena, sufficient material of the formation of existing ore-bodies. The analysis of the vadose waters in the Geyser mine has demonstrated the capability possessed by even cold surface waters of taking up such materials in their passage through the rocks. The subterranean waters that were circulating here at the time of the formation of the ore-deposits must have been much more energetic solvents, being heated by contact with the cooling masses of igneous rock, and probably deriving a certain amount of active and energetic mineralizing agents, such as fluorine, chlorine, etc., from these igneous masses at the time of contact. Hence it is fair to assume that the vein-materials in this region were originally derived from both recent and ancient eruptive rocks—a conclusion similar to that arrived at by Mr. Penrose, from his more exhaustive study of the ore-deposits of Cripple Creek.”

*The Occurrence and Treatment of Certain Gold Ores of Park County, Colorado.* By B. SADTLER, pp. 848–853.

*The Occurrence of Gold Ores in the Rainy River District, Ontario, Canada.* By WM. H. MERRITT, pp. 853–863.

Other papers — such for example — as *The Microstructure of Steel and the Current Theories of Hardening*, by ALBERT SAUVEUR, have direct application to the broad domin of theoretical geology.

C. F. TOLMAN JR.

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*The Law of Mines and Mining in the United States.* By DANIEL MOREAU BARRINGER and JOHN STOKES ADAMS. Little, Brown, & Co., Boston, 1897.

Although primarily a legal work this book possesses not a little interest and value to geologists in general and especially to those who have to deal with economic interests. It opens with a geological preface in which the various kinds of mineral deposits that are liable to be subjects of litigation are defined and their modes of occurrence and to some extent their origins are briefly stated, as these features are often decisive in the legal classification of the formations. The purpose of the work is to give a better appreciation of the reasons for the established legal distinctions relative to mineral deposits, insofar as these are based on differences in the nature, the mode of occurrence or the origin of the deposits. While the matter is not new to geologists and makes no pretension to exhaustiveness, its special point of view gives not a little freshness to the sketch. The legal classification of ore deposits is not without its suggestiveness to scientific students.

The body of the book opens with a chapter on property in minerals where there has been no division between the ownership of the surface and of the mineral below, followed by one on property rights where the title to the mineral or the right to take it out is vested in some one who is not the owner of the soil. It then treats of mineral leases and the rights and duties arising thereunder, and the modes of assignment and termination of leases. Chapters follow on the property of the sovereign and its grantees in minerals, for example, minerals in the beds of navigable streams or under public highways or in lands taken by eminent domain. There is also a discussion of the government's title and the granting thereof. A chapter is devoted to the discovery and location of claims, another to the extent of claims, and one each to the method by which claims are held, to the local mining rules and regulations, to the method by which title to mining claims may be terminated, and to the reloca-